

Exhibit D

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA
Alexandria Division**

United States of America, *et al.*,

Plaintiffs,

v.

Google LLC,

Defendant.

Case No. 1:23-cv-00108-LMB-JFA

Hon. Leonie H. M. Brinkema

EXPERT REPORT OF ROBIN S. LEE, PHD

December 22, 2023

power by ad servers that only facilitated the sale of instream video ads. A publisher’s “monetization toolbox” will likely require many different sorts of tools.³⁵¹

IV.B. Open-web display advertising is a distinct and important form of advertising for publishers and advertisers

- (261) In this section, I discuss why open-web display advertising is a distinct and valuable form of advertising for open-web publishers and advertisers. Within open-web display advertising, I also discuss why *indirect* transactions in particular provide additional value to publishers and advertisers.
- (262) Establishing the importance of open-web display advertising compared to other forms of advertising supports each of the relevant product markets that I discuss in Sections IV.C–IV.E below. This is because if open-web display advertising is distinct and valuable for open-web publishers and advertisers, then these customers would have limited ability to substitute away from *products used to transact such advertising* if those products were priced higher than competitive levels.
- (263) For publishers and advertisers, open-web display advertising satisfies a particular functionality and use case more efficiently or effectively than alternatives. As I discuss in more detail below, digital advertising is distinct from “offline,” or non-digital, advertising. In addition, within the broad category of digital advertising, there are important distinctions between open-web display advertising and other forms of digital advertising from the perspective of both publishers and advertisers that make them not close substitutes. Though the substitutability of open-web display advertising from alternatives will differ across these two sets of customers, as I discussed in Section III.B, products that facilitate the sale of open-web display advertising can comprise a relevant antitrust market even if *only* one of those two sets—publishers or advertisers—do not have close substitutes outside of the market.
- (264) The rest of this Section is organized as follows:
- In Section IV.B.1, I discuss why publishers obtain distinct value from open-web display advertising relative to other sources of monetization, and why other forms of monetization—although potentially used alongside open-web display advertising for some publishers—are differentiated from publishers’ perspectives.
 - In Section IV.B.2, I discuss why advertisers obtain distinct value from open-web display advertising relative to other forms of digital and non-digital advertising, and why open-web

³⁵¹ Analogously, advertisers may engage in both search and display advertising at the same time, but this does not mean that search advertising tools constrain a hypothetical monopolist of open-web display ad tech products from exercising market power. As I discuss further below, display advertising has features that are distinct and valued by advertisers, and advertisers often use a portfolio of advertising products to achieve their goals and reach different audiences.

display advertising is differentiated from other forms of advertising from advertisers' perspectives.

- In Section IV.B.3, consistent with the above, I show evidence that Google and other industry participants recognize important distinctions between open-web display advertising and other forms of advertising.
- In Section IV.B.4, I discuss why indirect transactions, and RTB transactions in particular, for open-web display advertising provide additional distinct value to publishers and advertisers compared to direct transactions.

IV.B.1. Open-web display advertising is an important and distinct form of monetization for publishers

- (265) Open-web publishers relying on advertising to monetize their digital content often use a portfolio of different forms of advertising.³⁵² In this Section, I discuss why open-web display advertising forms an important part of the monetization portfolio for open-web publishers, and why such publishers will tend to have limited ability to substitute away from display advertising to other forms of advertising. I also discuss why open-web publishers without their own integrated ad tech products cannot easily substitute to using integrated advertising tools to sell display advertising.
- (266) Note that open-web publishers that monetize at least some of their web inventory via digital advertising would not likely find substituting completely away from advertising to a consumer-payment model (e.g., subscriptions) to be a close substitute. For publishers that do not currently have a consumer-payment model, adopting a new monetization strategy can be costly and difficult.³⁵³ In particular, a publisher that attempts to adopt a consumer-payment model from scratch must induce consumers to pay for its content, market its product to new customers, and deliver enough value to keep its customers paying. For publishers that already have a consumer-payment model, substituting completely away from advertising would mean forgoing a valuable source of additional revenue.

IV.B.1.a. The sale of display advertising is distinct from other forms of advertising from the perspective of open-web publishers

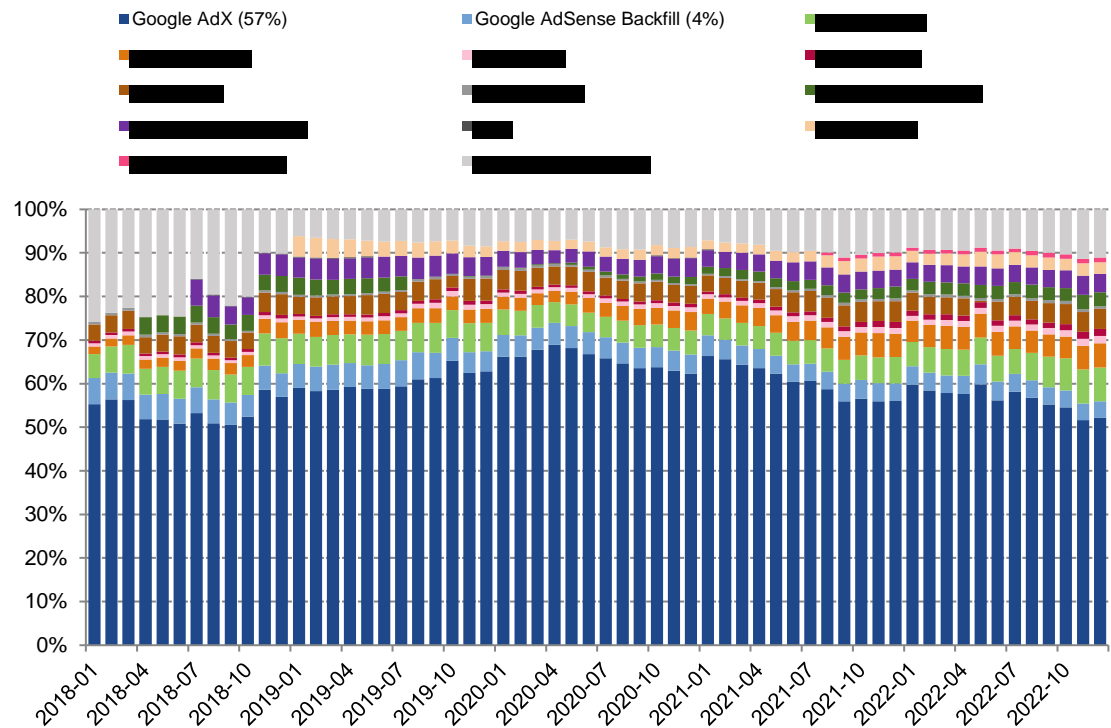
- (267) From the perspective of open-web publishers, the sale of display advertising is distinct from selling other forms of advertising. There are two primary reasons for this. First, a publisher may not have content that is suitable for other forms of advertising, such as instream video or in-app content.

³⁵² See Section IV.A.2.

³⁵³ As one academic paper notes, so-called “free-to-free” changes between advertising to subscription-based models are challenging for publishers because of the tendency of consumers to place a lower value on free (or discounted) content and resist paying for content that had been free (or discounted). Pontus Huotari and Paavo Ritala, “When to Switch between Subscription-based and Ad-sponsored Business Models: Strategic Implications of Decreasing Content Novelty,” *Journal of Business Research* 129 (2021), 14–28.

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Figure 47. AdX maintains a substantial share of worldwide indirect open-web display impressions transacted through ad exchanges (2018–2022)



Source: Google AdX data (DOJ RFP 53); Exchange panel (See Appendix H.1.c).
Notes: Denominator includes impressions from Google and ad exchanges that produced data in this matter, and impressions estimated from exchanges that did not produce data on this matter (“Other (imputed)”). The set of exchanges within “Other (imputed)” varies during the time period shown due to incomplete data from certain third-party exchanges. Appendix H provides a description of how I perform this estimation. The legend contains the share of indirect open-web display impressions in 2022 in parenthesis for those exchanges that produced data on indirect open-web display impressions in 2022.

V.C.3.b. Google is able to significantly deviate from competitive behavior in the ad exchange market

- (511) Evidence that Google has substantial and sustained market power in the ad exchange market includes its ability to meaningfully deviate from competitive behavior in that market.
- (512) As noted above, in a competitive market, a firm loses significant sales if it degrades the quality of its product, all else equal. In the ad exchange market, Google has degraded the quality of AdX in a manner that favors its other ad tech products by restricting the access and use of real-time bids from AdX by third-party publisher ad servers.⁷⁴² This policy discouraged publishers from using rival publisher ad servers, but it also restricted access to the supply of inventory available for AdX to buy on non-DFP servers. In a competitive market, an ad exchange (all else equal) would not likely be able to profitably restrict access to the supply of inventory available to its advertiser customers, as doing so would risk losing a large amount of its transaction volume to ad exchange rivals that did not impose such restrictions.
- (513) Google limiting AdX's real-time bids into rival publisher ad servers is consistent with Google's ability to deviate from competitive behavior in the ad exchange market. I discuss this conduct further in Section VII.C.
- (514) Moreover, Google's ability to substantially price discriminate in the ad exchange market is also consistent with it possessing substantial market power. With AdX Dynamic Revenue Sharing (AdX DRS), launched in August 2015 and persisting until September 2019, Google changed the take rate that AdX levied at the impression (or query) level. Experiments run in 2014 indicated that AdX DRS increased auctions won, revenue, and profit.⁷⁴³ According to Google, assuming "an agreed upon aggregate revenue share of 20% with a GAM publisher," AdX was able to charge a take rate as high as 40% "on a per-query basis."⁷⁴⁴ The ability to essentially double the take rate on a given query from the average fee is consistent with the possession of substantial market power.
- (515) Similarly, Google's Reserve Price Optimization (RPO) program, launched in April 2015, also demonstrates AdX's substantial market power.⁷⁴⁵

⁷⁴² See Section VII.C on Google's exclusive provision of unrestricted access and use of real-time bids from AdX to DFP.

⁷⁴³ GOOG-DOJ-14712011, at -013 (12/04/2014) ("The number of winning auctions increase, and so do revenue and profit."). See also Section VII.D.1, where I discuss AdX DRS in more detail.

⁷⁴⁴ See GOOG-AT-MDL-006217592, at -593 (12/12/2022) (Google's response to the European Commission's RFI states, "On a per-query basis, and assuming an agreed upon aggregate revenue share of 20% with a GAM publisher: (a) In the initial version of Dynamic Revenue Share, the minimum revenue share applied was 0% and the maximum revenue share applied was 20%. (b) In the second version of Dynamic Revenue Share (launched in December 2016), the minimum revenue share applied was 0% and the maximum revenue share applied was 40%, but the objective was to keep the average revenue share at 20% over queries.").

⁷⁴⁵ GOOG-AT-MDL-009013263, at -263 (05/01/2015) ("In April 2015, AdX launched buyer based RPO. In this version we use bid predictions based on the combination of publisher, inventory unit and buyer to set dynamic reserves."). Later that year on October 5th, Google launched "Cookie based RPO" which "set different reserve for every query based on

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- (516) In Section III.E, I described how a seller can increase its expected revenues in an auction by using a reserve price.⁷⁴⁶ As described by Google, RPO “has been a successful project for increasing publisher revenue in second price auctions” and worked by computing reserve prices “based on historical bids and applied in the AdX auction to increase the clearing price of matched queries.”⁷⁴⁷ As opposed to using information on bids from the current auction to adjust AdX’s margin (as in AdX DRS), RPO used historical bid information to dynamically set reserve prices for subsequent auctions.⁷⁴⁸ Notably, Google Ads was exempted from RPO on AdX.⁷⁴⁹
- (517) When launched, RPO meaningfully increased revenue from AdX buyers by increasing dynamically the reserve price they would face.⁷⁵⁰ A 2017 Google document noted a “key goal” of RPO “is to exploit the gap between the winning bid and the transaction price by inserting a (higher) reserve price between the two thereby inducing the winner to spend more.”⁷⁵¹ To increase publisher yields and payouts, RPO raised prices that advertisers using non-Google bidding tools paid for impressions transacted through AdX.⁷⁵² A Google executive noted in a December 2016 email that AdX would be

the buyer and cookie” See GOOG-AT-MDL-009644098. See also GOOG-AT-MDL-009013186, at -187 (05/26/2015). In early 2018, an “online” version of RPO was launched (GOOG-DOJ-15211461), in which Google uses “live” cookie data to update predictions (GOOG-AT-MDL-009013427, at -427). RPO was discontinued with the transition to first-price auctions (GOOG-AT-MDL-010514506, at -507, “1P RPO is more complicated and could not be done in time for 1P Auction, but we believe this optimization is crucial for 1P yield long-term.”), but relaunched as first-price RPO for a subset of web transactions in June 2022 and expanded to remaining GAM web traffic in January 2023 (GOOG-AT-MDL-009644610, GOOG-AT-MDL-013281679).

⁷⁴⁶ In a second-price auction, the reserve price affects the auction price when the reserve price is between the highest and second-highest bids. In a first-price auction, a reserve price tends to reduce bid-shading and increase submitted bids.

⁷⁴⁷ See GOOG-AT-MDL-009832160, (n.d.). See also GOOG-AT-MDL-009013192, at -194 (03/14/2016) (“Dynamic Price V1 (launched in April ’15)... Pick revenue-optimal reserve for given bid distribution... Bucketing by web_property, adslot_code, mobile_browser_class [,] buyer_newtork_id p.] Apply floors trained on yesterday’s data to today’s traffic.”).

⁷⁴⁸ GOOG-AT-MDL-B-002097533, at -533 (04/2015) (April 2015 email from Google employee Ali Amini, “I think with RPO we moved into a new world that as a buyer, your current bids can be used against you in the future. With DRS, as a buyer your current bid can be used against you in the current auction.”).

⁷⁴⁹ RPO initially exempted buyers at the query-level if they (i) set a minimum CPM value greater than 0, or (ii) submitted two or more open auction bids and had not removed self-second pricing. See GOOG-AT-MDL-009013505, at -506 (12/12/2017) (“we chose to exempt buyers that second price themselves from RPO”). In November 2017, Google changed this policy. See GOOG-AT-MDL-009013510, at -510 (11/14/2017) (“[i]n this launch we are changing the exemption policy to be based on a periodically computed whitelist of buyers. In order to get on the whitelist, a buyer needs to generate a certain amount of revenue lift via voluntary self-pricing. The amount of revenue lift required to get on a whitelist will be set to be a multiple of what RPO can provide on average for all buyers.”). See also GOOG-AT-MDL-B-002115457, at -458 (11/09/2017) (“the idea is to check if the minimum payments over a day actually result in significant revenue lift... If they do provide ‘significant’ increase in payments from a buyers (‘considerably’ higher than the average lift generated by RPO), then we exempt the buyer for the following day. As you would imagine, there’s no change for AdWords (since you’re not abusing the current mechanism to gain the system), but we do see an increase in AdX buyer revenue.”) and GOOG-AT-MDL-009013505, at -507 (12/12/2017).

⁷⁵⁰ GOOG-AT-MDL-009013263, at -263 (05/01/2015) (“This launch generated 4.5% incremental revenue from AdX (RTB+Hosted Bidding) buyers (About +0.85% on Adx+AdSense publishers overall).”) According to a 2016 document, “[o]n [AdX] Open Auction, buyers pay less than half of what they bid, on average. GOOG-AT-MDL-009013430, at -434 (05/09/2016). By February 2017, RPO was generating a lift of “over USD 300 million annually” and by 2019 the estimated incremental effect of RPO was \$500 million/year. See GOOG-AT-MDL-009013418, at -418 (02/2017) and GOOG-AT-MDL-010514506, at -507 (07/12/2020).

⁷⁵¹ GOOG-AT-MDL-009013418, at -418 (02/2017).

⁷⁵² According to a 2016 document, RPO “effectively reduces the gap between the first price and closing price increasing

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able to “reclaim” lost revenue “through more aggressive RPO tactics.”⁷⁵³ In July 2018, Google launched “Truthful DRS,” which adjusted reserve prices for some transactions such that AdX would pay the publisher less than the dynamic reserve price that it would set in the auction; in those cases, Google could recollect its lost profit via the difference between the RPO price and the next highest price in the auction.⁷⁵⁴

- (518) When discussing RPO Ali Nasiri Amini (then a senior staff scientist and current Google Vice President of Engineering) noted that, “[i]n an opaque market place [the] auctioneer tries different tricks to squeeze more money from buyers and their agents.”⁷⁵⁵ In a competitive market, AdX would not have been able to “squeeze more money” from advertisers without losing significant business to alternative ad exchanges. It is precisely because AdX possesses substantial market power that it is able to control prices for certain transactions and collect higher fees.

V.D. Google possesses substantial and sustained market power in the advertiser ad network market

- (519) Google’s advertiser ad network, Google Ads, is the largest advertiser ad network for open-web display advertising, and possesses substantial market power. In this section,
- I first describe key sources of Google’s market power in the advertiser ad network market (Section V.D.1), which include its unique access to advertiser demand and publisher inventory (including Google’s O&O properties and open-web AdSense publishers) and significant scale advantages over competitors.
 - I then provide measures of Google Ads’ market shares and discuss barriers to entry and expansion in the advertiser ad network market (Section V.D.2). Google Ads’ market share among advertiser ad networks that I have data for has been over 65% or higher since 2018 for both impressions and fees among worldwide open-web indirect display transactions.
 - Last, I provide direct evidence of Google Ads’ market power (Section V.D.3). This includes:

publisher yield” and “will never set a price below an existing floor [set by the publisher].” See GOOG-AT-MDL-009013430, at -432–433 (5/9/2016).

⁷⁵³ GOOG-TEX-00000655, at -660 (12/15/2016) (An email from Google Jim Giles noting that “we aren’t actually losing much money by giving [Last Look] up” with Exchange Bidding, stating: “reclaiming what money we lose is completely under our control through more aggressive RPO tactics”).

⁷⁵⁴ GOOG-AT-MDL-009644404 (“By adjusting reserve prices down dynamically we effectively adjust AdX’s profit margin from full margin to low margin to match more queries. The lost profit on these transactions will be recollected from the price gap between RPO price (and optionally buyer’s self min_payment) and the next highest price (we charge buyer RPO price+revshare and pay publisher less than RPO price).”).

⁷⁵⁵ GOOG-AT-MDL-B-002097533, at -534 (04/26/2015) (An email from Google employee Ali Amini).

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Most of the demand sources in the programmatic space were shared across all of the SSPs or ad exchanges, meaning that an independent DSP, like MediaMath or the Trade Desk, would bid into every SSP.

So having a unique demand source on your exchange had a dramatic impact on the market.

It also made it very difficult to switch. So if you think about switching from Rubicon to PubMatic, they may have slightly different technology, they might have slightly different features, different service, but the demand was all the same. And so there's very low switching cost.

With Google having a unique demand source, switching away from AdX or switching away from DFP would mean losing one of the largest demand sources, if not the largest demand source, and, therefore, would have significant monetization implications, or cost you a lot of money, or could, if you left.

VII.F.1.b. Google's exclusive provision of Dynamic and Enhanced Dynamic Allocation to AdX impaired rival ad exchanges' ability to compete for a substantial amount of publisher impressions

- (751) As I discussed in Section VII.D.1, Google's exclusive provision of first- and last-look advantages to AdX within DFP disadvantaged Google's ad exchange rivals, granting them fewer and less attractive impressions to bid upon or ultimately win.
- (752) Google's internal documents describe the significant advantages provided by Enhanced Dynamic Allocation (EDA) to AdX over rival ad exchanges. A December 2015 Google document entitled "Yield Management overview" noted: "The problem for publishers with [EDA] of course is that Google only allows its [sic] owned and operated ad exchange to win those impression opportunities."¹⁰⁹⁵
- (753) Elsewhere, Google quantified the benefits that it received from EDA and Last Look (as well as UPR, discussed below). For example, a Google slide stated that as of April 2014, EDA led to "6% boost in AdX queries and 35% incremental revenue."¹⁰⁹⁶ Likewise, the benefit of "last look" to Google can be seen in the adverse impact on Google when it removed last look, partly in response to customer feedback.¹⁰⁹⁷ Google estimated that "[g]iving up 'last look' over remnant line items / header bidding" as part of its migration to a unified auction "results in an 8% decrease in AdX revenue (-9.5% on

¹⁰⁹⁵ GOOG-TEX-00089490, at -496 (12/03/2015).

¹⁰⁹⁶ GOOG-DOJ-13952231, at -231 (04/15/2014).

¹⁰⁹⁷ GOOG-AT-MDL-008842393, at -401 (08/04/2023) (The Declaration of Nitish Korula states, "Following the initial alpha launch of Open Bidding, Google removed AdX's 'last look' over Open Bidding, by ensuring that the clearing price from the AdX auction was compared to the highest bid from an Open Bidding buyer. Google removed this in response to customer feedback, before Open Bidding became generally available in April 2018.").

open auction + private auction), and a 7.6% decrease in impressions,”¹⁰⁹⁸ and “an increase in spend on 3P SSPs” on “second-priced traffic”.¹⁰⁹⁹

(754) Documents and testimony from rival exchanges likewise indicate that Google’s exclusive provision of first- and last-look advantages to AdX place rival exchanges at a competitive disadvantage:

- OpenX, an exchange, summarized AdX’s advantage within DFP in a 2019 presentation. OpenX noted that AdX was able to bid “in real time on every impression vs static prices from third party exchanges.” Under “key points” in the speaker notes of the slide, OpenX noted that “the overwhelming majority of publishers use DFP as their ad server, which is a Google Product. As such, AdX was baked in, which gave Google (and still does) an innate advantage.”¹¹⁰⁰ John Gentry, CEO of OpenX, likewise testified that AdX’s last look advantage was “a negative factor” in OpenX’s ability to compete because it “did not create a level playing field in terms of the ability for [it]s bids to win.”¹¹⁰¹ He also testified that first look “prevented [OpenX] from competing” because AdX could “transact on a given request without the ability for OpenX to provide a realtime competitive bid”.¹¹⁰²
- Michael Shaughnessy, CEO of Kargo, an exchange, testified that “[i]t is challenging for a company like Kargo to compete” in part because they “don’t necessary [sic] have the same access points.”¹¹⁰³ Mr. Shaughnessy identified several ways Google’s conduct “make[s] it harder for other SSPs to compete against Google.”¹¹⁰⁴ For example, “dynamic allocation, and enhanced dynamic allocation...prior to header bidding, there wasn’t a dynamic opportunity for different vendors to compete within the ad stack.”¹¹⁰⁵ Likewise, “things like First Look...gives AdX the opportunity to compete with sponsorship line items, which traditionally other SSPs have not been able to do, even with the inclusion of header bidding.”¹¹⁰⁶ Mr. Shaughnessy also testified that last look “would give [Google] an advantage, that I’m unaware exists, with any of the other platforms,” specifically “[t]he opportunity to increase its win rates and the potential to concentrate more dollars within the platform.”¹¹⁰⁷ Mr. Shaughnessy confirmed that the type of net bid data gathered from last look provides “an advantage in future auctions” because “if you were

¹⁰⁹⁸ GOOG-DOJ-09713317, at -318 (08/13/2019).

¹⁰⁹⁹ GOOG-DOJ-AT-02204351, at -382 (09/03/2019). For a discussion of “2P bids on experiment traffic,” *see* GOOG-DOJ-AT-02204351, at -355 and -359 (09/03/2019).

¹¹⁰⁰ OPENX-00001611, at -620 (05/10/2019).

¹¹⁰¹ Deposition of John Gentry (OpenX), October 26, 2023, 34:5–35:1.

¹¹⁰² Deposition of John Gentry (OpenX), October 26, 2023, 36:14–37:9.

¹¹⁰³ Deposition of Michael Shaughnessy (Kargo), August 9, 2023, 26:14–27:16.

¹¹⁰⁴ Deposition of Michael Shaughnessy (Kargo), August 9, 2023, 51:18–51:21.

¹¹⁰⁵ Deposition of Michael Shaughnessy (Kargo), August 9, 2023, 51:23–52:7.

¹¹⁰⁶ Deposition of Michael Shaughnessy (Kargo), August 9, 2023, 52:22–53:17 and 71:21–73:3.

¹¹⁰⁷ Deposition of Michael Shaughnessy (Kargo), August 9, 2023, 81:2–81:24.

able to understand the predictive technology, what has happened historically, you could use it to your benefit to optimize winning ad slots.”¹¹⁰⁸

- Rubicon (now Magnite), an exchange, noted in a 2016 Board of Directors meeting presentation that “Header Bidding...[l]evels the playing field for smaller competitors” but that “Google has responded with EDA which is returning share to AdEx.”¹¹⁰⁹ It expected those share losses to continue, explaining that

Google’s privileged position as the ad server monopolist in the US enabled DoubleClick to roll out Enhanced Dynamic Allocation (EDA), which allows AdX to compete for impressions with ad tech competitors, and with non-guaranteed publisher direct sold campaigns, at every level of the ad server.¹¹¹⁰

- Adam Soroca, Chief Product Officer of Magnite, an exchange, similarly testified that due to Google’s “last look” advantage, Magnite “could not deliver campaigns at the full rate for [its] buyers at which [Google] could” and its “publishers were not seeing the full monetization that they could because the real price curve was obfuscated.”¹¹¹¹ He explained that last look “limits the amount of share that the – that Magnite and other exchanges can get because this last look opportunity is the ability to win at a higher rate than anyone else” and that “because they have more information than anyone else” it “limits competition.”¹¹¹²
- Arnaud Creput, CEO of Equativ (a provider of an exchange and publisher ad server), testified that last look “translates into a win rate at the auctions of – which is much more significant for Google than for all the other SSPs. This allows Google to optimize in a very significant way. For example, the cost of these infrastructures.”¹¹¹³
- Andrew Casale, President and CEO of Index Exchange, testified that Google’s “last look” advantage allows it “to cherry-pick potentially significant swaths of bids and...completely undermines the auction being fair or objective.”¹¹¹⁴ He testified that advantage results in higher win rates, and “[t]he more transactions you clear, the more data you have to feed ML [machine learning] and data science to solve [significant optimization problems] in a superior way.”¹¹¹⁵
- Brian O’Kelley, former CEO of AppNexus, testified that “last look” has allowed Google to “basically get better pricing, get better outcomes than anyone else” and that “in terms of their

¹¹⁰⁸ Deposition of Michael Shaughnessy (Kargo), August 9, 2023, 83:11–84:25.

¹¹⁰⁹ MAGNITE-00007152, at -189 (07/21/2016).

¹¹¹⁰ MAGNITE-00007152, at -193-194 (07/21/2016).

¹¹¹¹ Deposition of Adam Soroca (Magnite), August 31, 2023, 31:21–32:12.

¹¹¹² Deposition of Adam Soroca (Magnite), August 31, 2023, 32:21–33:22.

¹¹¹³ Deposition of Arnaud Creput (Equativ), September 5, 2023, 62:1–62:19.

¹¹¹⁴ Deposition of Andrew Casale (Index Exchange), September 26, 2023, 211:4-212:18.

¹¹¹⁵ Deposition of Andrew Casale (Index Exchange), September 26, 2023, 212:19–213:18.

ability to out-price competitors, it had a huge impact.”¹¹¹⁶ He clarified that it “translated to both their market story—they would tell that story to agencies and advertisers” and that “[it was very powerful for win rates” and “let them effectively manipulate auctions and manipulate the decisioning process, in their benefit.”¹¹¹⁷

- (755) As I discussed in Section VII.D.1, Google opened up Dynamic Allocation access to rival exchanges when Open Bidding fully launched in April 2018 (albeit with an Open Bidding fee), and more broadly in 2019 with the UFPA to also include header bidding exchanges. However, due to the durability of network effects and scale effects described in Sections III.A and III.D, the harm to rivals’ competitiveness from Google’s conduct likely persists.

VII.F.1.c. Google’s variable floor restriction impeded publishers’ abilities to sell impressions through rival ad exchanges

- (756) As I discussed in Section VII.D.2, Google’s variable floor restriction within UPR impeded publishers’ ability to impose competitive pressures on AdX and steer more transaction volumes to rival exchanges by relying on variable pricing floors.
- (757) Prior to the launch of the UFPA, Google estimated the effect of UPR as a “6.4% increase in value of open auction + private auction impressions won by AdX and a 32.6% increase in impressions,” along with a “negative effect on external exchange spend.”¹¹¹⁸ Because Google’s variable floor restriction increased AdX impressions by preventing publishers from setting higher floors on AdX than on rival exchanges, AdX’s increase in impressions contains impressions that were diverted from rival exchanges.
- (758) Consistent with Google’s estimated effects and the description above, rival exchanges identified a decrease in impressions following the introduction of the variable floor restriction. For example, an August 2019 email from a Rubicon [a rival exchange] employee to a Google employee indicates that Rubicon’s approximate win rate fell from 29/30% to 23/24% corresponding to “about ~\$100k/day opp loss due to this change.”¹¹¹⁹ Subsequent internal Google emails identified Rubicon’s experience as part of a broader pattern, with one employee noting that “Rubicon and the greater EB community have seen a decline in spend since first price / UPR” and another predicting that “this will be magnified further as the frequency of auctions with UPR’s increases.”¹¹²⁰ Notably, Google employees noted that “any info about share-shift between OB / AB is extremely sensitive and not something we

¹¹¹⁶ Deposition of Brian O’Kelley (AppNexus), September 29, 2023, 123:22–125:20.

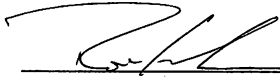
¹¹¹⁷ Deposition of Brian O’Kelley (AppNexus), September 29, 2023 at 125:13–126:19.

¹¹¹⁸ GOOG-DOJ-09713317, at -318 (08/13/2019). *See also* GOOG-DOJ-AT-02204351, at -381 and -355 (09/03/2019) (describing the “Jun-Sep ’19 Experiments phase”).

¹¹¹⁹ GOOG-DOJ-15044036, at -039–040, (08/15/2019).

¹¹²⁰ GOOG-DOJ-15044036, at -036–039, (08/15/2019).

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E.2. Aggregate take rates among exchanges and ad networks

Figure 110. Summary of worldwide open-web indirect display take rates among ad exchanges

Exchange	Average take rate					Share of impressions (2022)
	Jan. 2018	Jan. 2019	Jan. 2020	Jan. 2021	Jan. 2022	
Google AdX	20%	20%	20%	20%	20%	56%
██████	12%	14%	15%	16%	18%	6%
██████	26%	21%	19%	19%	17%	5%
██████████	-	17%	18%	17%	16%	4%
██████	-	-	9%	8%	8%	4%
██████	-	9%	20%	18%	17%	3%
██████	24%	21%	17%	19%	18%	1%
██████████	-	-	-	-	20%	1%
██████	37%	37%	38%	37%	29%	1%
██████	-	0%	-	13%	-	-
██████	20%	20%	20%	20%	-	-
██████████	-	19%	-	-	-	3%
██████	-	20%	-	-	-	1%

Source: Google AdX data (DOJ RFP 53); Exchange panel (See Appendix H.1.c); ██████████ (SmartAdserver Ratecard 2019); ██████████

Notes: The take rates presented in this table are weighted averages in January of each year. I calculate take rates as net revenue divided by gross revenue. Figure 54 in Section V.C.3 presents monthly average take rates in each month from 2018–2022 among a limited set of exchanges that produced data on gross and net revenues. The table above includes all exchanges that produced gross and revenue data, as well as exchanges that produced data in this matter but did not produce data sufficient to calculate take rates (indicated with an asterisk). For those exchanges, the take rates presented above are those represented in the party's produced financial documents. The products in this table do not represent the universe of products in the ad exchanges market but represent the full list of exchanges that produced data in this matter. AdSense Backfill take rates are excluded as they include the take rate for Google Ads as well.

Figure 111. Summary of worldwide open-web indirect display margins among ad networks

Ad network	Inventory source	Average margin					Share of impressions (2019)
		Jan. 2018	Jan. 2019	Jan. 2020	Jan. 2021	Jan. 2022	
Google Ads	AdX	13%	12%	13%	15%	14%	88%
	AdSense	32%	33%	32%	32%	32%	
	3PE	12%	34%	34%	34%	32%	
	Other (Demand Product, unknown)	0%	24%	37%	31%	35%	
██████		42%	39%	42%	40%	40%	11%
██████████		20%	19%	24%			1%

Source: Google Ads data (DOJ RFP 7); Bidding tools panel (See Appendix H.1.b).

Notes: The take rates presented in this table are weighted averages in January of each year. I calculate margins as net revenue divided by gross revenue. For Google Ads transactions through AdX, I remove the 20% fee taken by AdX from Google's net revenues to isolate fees collected by Google Ads. Google aggregates buy-side and sell-side fees for transactions through AdSense. The table above includes all ad networks that produced gross and net revenue data. ██████████ exited the open-web display market in mid-2020 and exits the data after June 2021.